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EXAMINER	
THANGAVELU, KANDASAMY	
ART UNIT	**PAPER NUMBER**
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)
	09/873,988	YANG ET AL.
	Examiner	**Art Unit**
	Kandasamy Thangavelu	2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-8,10-12,14-17,19-22,24-26,28-31 and 33-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10-12,14,17,19-22,24-26,28,31,33,35,36 and 44-48* is/are allowed.

6)☒ Claim(s) *3-8,15,16,29,30,37 and 43* is/are rejected.

7)☒ Claim(s) *38-42* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *January 27, 2005*.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

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DETAILED ACTION

1. This communication is in response to the Applicants' Response mailed on February 15, 2005. Claims 3-5, 7-8, 10-12, 14-15, 17, 19-20, 24-26, 28-29, 31 and 33-34 were amended. Claims 1-2, 9, 13, 18, 23, 27 and 32 were deleted. Claims 37-48 were added. Claims 3-8, 10-12, 14-17, 19-22, 24-26, 28-31 and 33-48 of the application are pending. This office action includes rejections under 35 USC 112 First Paragraph and Second Paragraph and is therefore made non-final.

Drawings

2. The drawings are objected to; see a copy of Form PTO-948 sent with the previous Office action dated September 15, 2004.

Claim Objections

3. The following is a quotation of 37 C.F.R § 1.75 (d)(1):

> The claim or claims must conform to the invention as set forth in the remainder of the specification and terms and phrases in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

4. Claim 33 is objected to because of the following informalities:

In amended claim 33, Lines 20-21, "to carry out the step of determining whether to increase order accuracy of the particular interval", appears to be incorrect and it

appears that it should be, "to carry out the step of determining whether to increase order of accuracy of the particular interval".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. §112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 3-8, 15-16 and 29-30 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 4, line 3 states, "defining a differential-algebraic equation of the circuit". This is not supported anywhere in the specification. Specification Page 10, lines 2-3 state, "circuit behavior is usually described by a set of N nonlinear differential-algebraic equations".

Claim 5, line 3 states, "defining a differential-algebraic equation of the circuit". This is not supported anywhere in the specification. Specification Page 10, lines 2-3 state, "circuit behavior is usually described by a set of N nonlinear differential-algebraic equations".

Claim 15, Lines 3-4 state, "the boundary-value differential-algebraic equations include a first and a last interval". This is not supported anywhere in the specification. It is not understood as to what is meant by "the boundary-value differential-algebraic equations include a first and a last interval". Specification Page 16, Lines 12-15 state, "Continuity of the solution is enforced at the boundaries of any two intervals. For the first and last interval, this has the effect of enforcing the periodic boundary condition".

Claim 29, Lines 3-4 state, "the boundary-value differential-algebraic equations include a first and a last interval". This is not supported anywhere in the specification. It is not understood as to what is meant by "the boundary-value differential-algebraic equations include a first and a last interval". Specification Page 16, Lines 12-15 state, "Continuity of the solution is enforced at the boundaries of any two intervals. For the first and last interval, this has the effect of enforcing the periodic boundary condition".

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 3-8, 15-16 and 29-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 4, Lines 14-16 state, "approximation to the desired solution of the differential-algebraic equations is $I_M\, u(t) = \Sigma_{k=0}{}^M u_k{}^{\sim}\, T_k\,(t)$, wherein M is the highest degree of the interpolating polynomials". In this equation, the variables I_M, $u(t)$, $u_k{}^{\sim}$ and $T_k\,(t)$ are undefined.

In claim 5, Lines 15-18 state, "approximation to the desired solution of the differential-algebraic equations is $I_M\, u(t) = \Sigma_{k=0}{}^M u_k{}^{\sim}\, T_k\,(t)$, wherein M is the highest degree of the interpolating polynomials; and

a derivative of the approximation is $(I_M\, u)'\,(t) = \Sigma_{k=0}{}^M u_k{}^{\sim'}\, T_k\,(t)$".

In these equations, the variables I_M, $u(t)$, $u_k{}^{\sim}$, $T_k\,(t)$ and $u_k{}^{\sim'}$ are undefined.

Claim 15, Lines 3-4 state, "the boundary-value differential-algebraic equations include a first and a last interval". It is not understood as to what is meant by "the boundary-value differential-algebraic equations include a first and a last interval". Therefore, the terms "equations include a first and a last interval" are vague and indefinite.

Claim 29, Lines 3-4 state, "the boundary-value differential-algebraic equations include a first and a last interval". It is not understood as to what is meant by "the boundary-value

differential-algebraic equations include a first and a last interval". Therefore, the terms "equations include a first and a last interval" are vague and indefinite.

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 3-5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Roychowdhury** (U.S. Patent 5,5,995,733) in view of **Fabien** ("Indirect numerical solution of

constrained optimal control problems with parameters", IEEE 1995), and further in view of **Srinivasan et al.** ("A multi-criteria approach to dynamic optimization", IEEE 1995) and **Yang et al.** ("A Pseudospectral method for time-domain computation of electromagnetic scattering by bodies of revolution", IEEE 1999).

11.1 **Roychowdhury** teaches Method and apparatus for efficient design and analysis of integrated circuits using multiple time scales. Specifically, as per claim 4, **Roychowdhury** teaches a method of simulating a circuit (CL3, L3-4; CL3, L30-31; CL14, L29-30; CL14, L64; CL15, L39-41); the method comprising:

defining a differential-algebraic equation of the circuit (CL3, L36-38; CL6, L53-56; CL7, L1-2; CL8, L42-43);

applying a collocation method to discretize the differential-algebraic equation (CL9, L39-40; CL10, L6-7; CL9, L15-16); wherein

the simulation time interval has collocation points (CL10, L6-7; Cl9, L27-38);

Roychowdhury teaches simulating multitone problem by representing signals in mildly nonlinear paths to obtain a relation between two sets of time domain samples separated by a period of strongly non-linear tones. **Roychowdhury** does not expressly teach defining a simulation time interval corresponding to the differential-algebraic equation. **Fabien** teaches defining a simulation time interval corresponding to the differential-algebraic equation (Page 2075, CL1, Abstract L9-13), because that allows numerical solution of boundary value differential algebraic equations using shooting methods (Page 2075, CL1, Abstract L10-13). It

would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Roychowdhury** with the method of **Fabien** that included defining a simulation time interval corresponding to the differential-algebraic equation. The artisan would have been motivated because that would allow numerical solution of boundary value differential algebraic equations using shooting methods.

Roychowdhury does not expressly teach dividing the simulation time interval into time intervals, wherein the time intervals have corresponding polynomials for each time interval, wherein each polynomial is a portion of an approximation to a desired solution of the differential-algebraic equation. **Fabien** teaches dividing the simulation time interval into time intervals, wherein the time intervals have corresponding polynomials for each time interval, wherein each polynomial is a portion of an approximation to a desired solution of the differential-algebraic equation (Page 2075, CL2, Para 2), because that results in solutions that are continuous at the nodes while satisfying the boundary conditions (Page 2075, CL2, Para 3). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Roychowdhury** with the method of **Fabien** that included dividing the simulation time interval into time intervals, wherein the time intervals have corresponding polynomials for each time interval, wherein each polynomial is a portion of an approximation to a desired solution of the differential-algebraic equation. The artisan would have been motivated because that would result in solutions that would be continuous at the nodes while satisfying the boundary conditions.

Roychowdhury teaches interpolating polynomial (CL4, L45-47). **Roychowdhury** does not expressly teach that the interpolating polynomial has a degree of M. **Srinivasan et al.**

teaches that the interpolating polynomial has a degree of M (Page 1768, CL1, Para 2, L31), because that would allow discretization by imposing the residual equation to be zero at M prefixed points in time known as the collocation points (Page 1768, CL1, Para 2, L15-17). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Srinivasan et al.** that included the interpolating polynomial having a degree of M. The artisan would have been motivated because that would allow discretization by imposing the residual equation to be zero at M prefixed points in time known as the collocation points.

Roychowdhury does not expressly teach that the approximation to the desired solution of the differential-algebraic equations is $I_M u(t) = \Sigma_{k=0}^{M} u_k^{\sim} T_k(t)$, wherein M is the highest degree of the interpolating polynomial. **Yang et al.** teaches that the approximation to the desired solution of the differential-algebraic equations is $I_M u(t) = \Sigma_{k=0}^{M} u_k^{\sim} T_k(t)$, wherein M is the highest degree of the interpolating polynomial (Page 134, CL2, Para 6), because that would allow solution of the partial differential equations using Chebyshev collocation methods and Chebyshev interpolant of order M (Page 134, CL2, Para 6). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Yang et al.** that included the approximation to the desired solution of the differential-algebraic equations being $I_M u(t) = \Sigma_{k=0}^{M} u_k^{\sim} T_k(t)$, wherein M is the highest degree of the interpolating polynomial. The artisan would have been motivated because that would allow solution of the partial differential equations using Chebyshev collocation methods and Chebyshev interpolant of order M.

11.2 As per claim 3, **Roychowdhury, Fabien, Srinivasan et al.** and **Yang et al.** teach the method of Claim 4. **Roychowdhury** does not expressly teach that located at each collocation point t_j is a value of $u(t_j)$ respectively, to be interpolated with polynomials. **Srinivasan et al.** teaches that located at each collocation point t_j is a value of $u(t_j)$ respectively, to be interpolated with polynomials (Page 1768, CL1, Para 2, L4-5), because that would allow converting the problem with differential-algebraic equations to a non-linear programming problem with only algebraic constraints (Page 1768, CL1, Para 2, L1-3). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Srinivasan et al.** that included located at each collocation point t_j there being a value of $u(t_j)$ respectively, to be interpolated with polynomials. The artisan would have been motivated because that would allow converting the problem with differential-algebraic equations to a non-linear programming problem with only algebraic constraints.

11.3 As per claim 5, it deals with a method of simulating a circuit and includes all the limitations of claim 4 and additionally includes the limitation, "a derivative of the approximation is $(I_M u)'(t) = \Sigma_{k=0}^{M} u_k^{\sim'} T_k(t)$". **Roychowdhury, Fabien, Srinivasan et al.** and **Yang et al.** teach the method of Claim 4, excepting this additional limitation.

Roychowdhury does not expressly teach that a derivative of the approximation is $(I_M u)'(t) = \Sigma_{k=0}^{M} u_k^{\sim'} T_k(t)$. **Yang et al.** teaches that a derivative of the approximation is $(I_M u)'(t) = \Sigma_{k=0}^{M} u_k^{\sim'} T_k(t)$ (Page 135, CL1, Para 1), because that would allow the partial differential equation to be satisfied at the collocation points (Page 135, CL1, Para 1). It would have been

obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Yang et al.** that included a derivative of the approximation being $(I_M u)'(t) = \Sigma_{k=0}^{M} u_k^{\sim'} T_k(t)$. The artisan would have been motivated because that would allow the partial differential equation to be satisfied at the collocation points.

Per claim 7: **Roychowdhury** teaches that the circuit is a radio frequency (RF) circuit (CL2, L22-25; CL2, L66 to CL3, L4).

11.4 As per claim 8, **Roychowdhury, Fabien, Srinivasan et al.** and **Yang et al.** teach the method of Claim 4. **Roychowdhury** does not expressly teach that the step of applying a collocation method comprises applying Chebyshev collocation to discretize the set of differential-algebraic equation. **Yang et al.** teaches that the step of applying a collocation method comprises applying Chebyshev collocation to discretize the set of differential-algebraic equation (Page 134, CL2, Para 5), because Chebyshev collocation methods provide superior approximation properties (Page 134, CL2, Para 5). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Yang et al.** that included the step of applying a collocation method comprising applying Chebyshev collocation to discretize the set of differential-algebraic equation. The artisan would have been motivated because Chebyshev collocation methods would provide superior approximation properties.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Roychowdhury** (U.S. Patent 5,5,995,733) in view of **Fabien** ("Indirect numerical solution of constrained optimal control problems with parameters", IEEE 1995), and further in view of **Srinivasan et al.** ("A multi-criteria approach to dynamic optimization", IEEE 1995), **Yang et al.** ("A Pseudospectral method for time-domain computation of electromagnetic scattering by bodies of revolution", IEEE 1999) and **Pasic** ("An algorithm for numerical solution of differential-algebraic equations", IEEE 1997).

12.1 As per claim 6, **Roychowdhury, Fabien, Srinivasan et al.** and **Yang et al.** teach the method of Claim 5. **Roychowdhury** does not expressly teach that each coefficient $u_k^{\sim'}$ is computed from $u_k^{\sim}$. **Pasic** teaches that each coefficient $u_k^{\sim'}$ is computed from $u_k^{\sim}$ (Page 4913, CL1, Para 1-4), because that would allow determining the unknown polynomial coefficients needed to find the solution to the differential-algebraic equation (Page 4913, CL1, Para 4). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Pasic** that included each coefficient $u_k^{\sim'}$ being computed from $u_k^{\sim}$. The artisan would have been motivated because that would allow determining the unknown polynomial coefficients needed to find the solution to the differential-algebraic equation.

13. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Roychowdhury** (U.S. Patent 5,5,995,733) in view of **Yang et al.** ("A Pseudospectral method for time-domain computation of electromagnetic scattering by bodies of revolution", IEEE 1999).

13.1 As per claim 37, **Roychowdhury** teaches a method of simulating an rf circuit (CL3, L3-4; CL3, L30-31; CL14, L29-30; CL14, L64; CL15, L39-41); the method comprising:

determining a plurailty of differential equations describing operation of the rf circuit (CL3, L36-38; CL6, L53-56; CL7, L1-2; CL8, L42-43);

solving the differential equations in each of the intervals (Abstract, L9-14; Fig. 23, Item 236); and

simulating the rf circuit based on the solved intervals (CL3, L3-4; CL3, L30-31; CL14, L29-30; CL14, L64; CL15, L39-41).

Roychowdhury teaches the simulation time interval has collocation points (CL10, L6-7; Cl9, L27-38). **Roychowdhury** does not expressly teach determining a set of Chebyshev Gauss-Lobatto collocation points for the plurality of differential equations, producing a set of intervals. **Yang et al.** teaches determining a set of Chebyshev Gauss-Lobatto collocation points for the plurality of differential equations, producing a set of intervals (Page 134, CL2, Para 5 and Para 6), because that would allow determining the spatial partial derivatives at the collocation points and identifying the conditions to be satisfied at the collocation points, so approximate solutions to the partial differential equations could be obtained (Page 135, CL1, Para 1). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Yang et al.** that included determining a set of Chebyshev Gauss-Lobatto collocation points for the plurality of differential equations, producing a set of intervals. The artisan would have been motivated because that

would allow determining the spatial partial derivatives at the collocation points and identifying the conditions to be satisfied at the collocation points, so approximate solutions to the partial differential equations could be obtained.

Roychowdhury teaches discretizing each of the differential equations (CL9, L39-40; CL10, L6-7; CL9, L15-16). **Roychowdhury** does not expressly teach discretizing each of the differential equations based on the Chebyshev Gauss-Lobatto collocation point intervals. **Yang et al.** teaches discretizing each of the differential equations based on the Chebyshev Gauss-Lobatto collocation point intervals (Page 134, CL2, Para 5 and Para 6), because that would allow approximate solutions to the partial differential equations to be obtained (Page 135, CL1, Para 1). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to combine the method of **Roychowdhury** with the method of **Yang et al.** that included discretizing each of the differential equations based on the Chebyshev Gauss-Lobatto collocation point intervals. The artisan would have been motivated because that would allow approximate solutions to the partial differential equations to be obtained.

14. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Roychowdhury** (U.S. Patent 5,5,995,733) in view of **Yang et al.** ("A Pseudospectral method for time-domain computation of electromagnetic scattering by bodies of revolution", IEEE 1999), and further in view of **Fabien** ("Indirect numerical solution of constrained optimal control problems with parameters", IEEE 1995).

14.1 As per claim 43, **Roychowdhury** and **Yang et al.** teach the method of Claim 37. **Roychowdhury** does not expressly teach the method further comprising enforcing continuity of the solution at each interval boundary. **Fabien** teaches the method further comprising enforcing continuity of the solution at each interval boundary (Page 2075, CL1, Abstract L9-13), because that allows numerical solution of boundary value differential-algebraic equations using shooting methods (Page 2075, CL1, Abstract L10-13). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Roychowdhury** with the method of **Fabien** that included the method further comprising enforcing continuity of the solution at each interval boundary. The artisan would have been motivated because that would allow numerical solution of boundary value differential-algebraic equations using shooting methods.

Allowable Subject Matter

15. Claims 10-12, 14, 17, 19, 20-22, 24-26, 28, 31, 33, 35-36 and 44-48 are allowed.

Claims 19 and 33 include the limitation "the solution in a particular interval is smooth, and wherein the step of determining the order of accuracy desired in each interval comprises determining whether to increase the order of accuracy of the particular interval". The closest prior art in references by **Roychowdhury, Fabien, Srinivasan et al., Yang et al.** and **Pasic** does not teach this limitation. Therefore, these claims are allowable.

Claims 20 and 34 include the limitation "the solution in a particular interval is not smooth, and wherein the step of determining the order of accuracy desired in each interval comprises splitting the particular interval into at least two subintervals". The closest prior art in references by **Roychowdhury, Fabien, Srinivasan et al., Yang et al.** and **Pasic** does not teach this limitation. Therefore, these claims are allowable.

Claim 44 includes the limitation "determining a set of collocation points for the plurality of differential equations, producing a set of intervals comprising at least one high convergence interval and a plurality of low convergence intervals". The closest prior art in references by **Roychowdhury, Fabien, Srinivasan et al., Yang et al.** and **Pasic** does not teach this limitation. Therefore, this claim is allowable.

Claims that are not allowed specifically are allowed because of their dependence on allowed claims.

16. Claims 38-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

17. Applicant's arguments filed on February 15, 2005 have been fully considered. The arguments with respect to 103 (a) rejections are not persuasive.

17.1 As per the applicants' argument that "the cited art fails to teach or suggest the Chebyshev Gauss-Lobatto collocation points discreticized as claimed", the examiner respectfully disagrees.

Yang et al. teaches determining a set of Chebyshev Gauss-Lobatto collocation points for the plurality of differential equations (Page 134, CL2, Para 5 and Para 6), because that would allow determining the spatial partial derivatives at the collocation points and identifying the conditions to be satisfied at the collocation points, so approximate solutions to the partial differential equations could be obtained (Page 135, CL1, Para 1). **Yang et al.** teaches discretizing each of the differential equations based on the Chebyshev Gauss-Lobatto collocation point intervals (Page 134, CL2, Para 5 and Para 6), because that would allow approximate solutions to the partial differential equations to be obtained (Page 135, CL1, Para 1).

17.2 As per the applicants' argument that "Claim 4 recites … absent specific instructions (e.g., a roadmap) on how to piece together many highly complicated references, the ordinarily skilled artisan would not be able to replicate Applicant's claimed invention; even if the ordinary skilled artisan were somehow motivated to create Applicants' claimed invention, without further inventive input, he would not have the skills or tools to do so; in contrast, Applicants claimed invention is the roadmap needed to do exactly that; …", the examiner respectfully disagrees.

The Examiner requests applicants' attention to Paragraph 11.1 above, where it is presented how **Roychowdhury, Fabien, Srinivasan et al.** and **Yang et al.** teach the method of

Claim 4. Paragraph 11.1 also presents the motivations for one of ordinary skill in the art to combine the teachings of **Roychowdhury, Fabien, Srinivasan et al.** and **Yang et al.** to arrive at the claimed invention of claim 4.

At the time of the applicants' invention all elements of claim 4 were known to one of ordinary skill in the art as shown in Paragraph 11.1 above. Collocation methods were known and used to divide the simulation intervals into small intervals; applying boundary conditions and continuity conditions at the boundaries at collocation points were also known to discretize the differential-algebraic equations and to arrive at the approximate solutions to the equations as shown in Paragraph 11.1 above. The motivation to combine the elements would be that one of ordinary skill in the art would want to solve the differential-algebraic equations defining the RF circuits using numerical method to arrive at steady state approximate solutions, while satisfying the boundary conditions at collocation points, because that would help him design the RF circuits better. One of ordinary skill in the art would have necessary simulation tools to simulate the RF circuits and solve the differential algebraic equations, because without such simulation tools, one of ordinary skill in the art would not be able to analyze and design the RF circuits.

17.3 As per the applicants' argument that "with regard to Claim 5, ... however, every skilled artisan is motivated to solve differential equations at all points; nothing in *Roychowdhury, Fabian,* and *Srinivasan* (the *RFS* combination) truly suggests or points to the need for additional combination or reference; moreover the problem solved by combining *Yang* with the *RFS* combination is a problem that only becomes apparent because of the *RFS* combination and then only when viewed in light of the claimed invention; therefore, it is respectfully submitted that the

RFS combination alone cannot suggest or motivate a practitioner to solve a problem that only occurs after the combination because that problem is not apparent until the combination is made; therefore, Applicants respectfully submit that looking to *Yang* as an obvious addition to the *RFS* combination is more than what could be expected from the ordinarily skilled artisan", the examiner respectfully disagrees.

At the time of the applicants' invention all elements of claim 5 were known to one of ordinary skill in the art as shown in Paragraph 11.3 above. Collocation methods were known and used to divide the simulation intervals into small intervals; applying boundary conditions and continuity conditions at the boundaries at collocation points were also known to discretize the differential-algebraic equations and to arrive at the approximate solutions to the equations as shown in Paragraph 11.3 above. The motivation to combine the elements would be that one of ordinary skill in the art would want to solve the differential-algebraic equations defining the RF circuits using numerical method to arrive at steady state approximate solutions, while satisfying the boundary conditions at collocation points, because that would help him design the RF circuits better. One of ordinary skill in the art would have necessary simulation tools to simulate the RF circuits and solve the differential algebraic equations, because without such simulation tools, one of ordinary skill in the art would not be able to analyze and design the RF circuits.

17.4 As per the applicants' argument that "the rejection of Claim 6 under 35 USC 103(a) over the combination of *Roychowdhury, Fabian, Srinivasan, Yang,* and Pasic; ... the RFS combination and Yang, absent a roadmap such as Applicants specification and claimed

invention, fails to suggest the claimed invention; in part, such failure is because the references are highly technical solutions that would take either an extraordinary level of skill or a roadmap to piece together to meet Applicants claimed limitations; further, the problem solved by the combination is only apparent once the combination is formed and when viewed in light of the claimed invention; in the case of Claim 6, each of these reasons is further magnified by the addition of the fifth reference by Pasic; therefore, even if the cited references teach each claimed limitation, the cited references fail to put together or suggest that same combination, and it would be unreasonable to expect the ordinarily skilled artisan to do the same absent the roadmap provided by Applicants' disclosure and/or claims", the examiner respectfully disagrees.

At the time of the applicants' invention all elements of claim 6 were known to one of ordinary skill in the art as shown in Paragraph 12.1 above. Collocation methods were known and used to divide the simulation intervals into small intervals; applying boundary conditions and continuity conditions at the boundaries at collocation points were also known to discretize the differential-algebraic equations and to arrive at the approximate solutions to the equations as shown in Paragraph 11.3 above. The motivation to combine the elements would be that one of ordinary skill in the art would want to solve the differential-algebraic equations defining the RF circuits using numerical method to arrive at steady state approximate solutions, while satisfying the boundary conditions at collocation points, because that would help him design the RF circuits better. One of ordinary skill in the art would have necessary simulation tools to simulate the RF circuits and solve the differential algebraic equations, because without such simulation tools, one of ordinary skill in the art would not be able to analyze and design the RF circuits.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on 571-272-3716. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K. Thangavelu
Art Unit 2123
April 21, 2005